INCIDENCE RATE, RISK FACTORS AND OUTCOME OF PRETERM PREMATURE RUPTURE OF MEMBRANES (PROM) AT ZAGAZIG UNIVERSITY HOSPITALS

Ali El-Shabrawy Ali¹, Wael Sabry Nossair¹, Randa Mohamed Reda Abdel Maaboud¹, Safaa Abdel salam Ibrahem¹
¹Department, Obstetrics and Gynecology, Faculty of Medicine, Zagazig University, Egypt.
randamohamed007@gmail.com

ABSTRACT

Objective: To measure the incidence rate of PPROM among pregnant women attending Zagazig University hospital, and to identify the fetal/neonatal outcome and potential factors associated with poor fetal/neonatal outcome.

Methods: A cross sectional study, was carried out at ER department of zagazig university hospitals for vaginal deliveries, from July 2019 till January 2020, on 69 women with premature rapture of membrane. All patients were subjected to detailed history taking, General examination, Laboratory Investigations included.

Results: There were 46 mother gave birth of healthy babies with good APGAR score (66.7%), 15 with babies needed o2 incubators (21.7%) and 8 with babies were put on ventilators (11.6%). The outcome of mothers there were 68 mother with no bad outcomes and 1 with chorioamnionitis. The risk factors of the cases were 15 with no risk factor (21.7%), 8 with previous PROM (11.6%), 6 with multi pregnancy (8.7%), 12 with Antepartum (17.4%), 16 with infections (23.2%) and 12 with chronic diseases (17.4%).

Conclusions: we can conclude that, younger, illiterate parturient women were found to be provoking factors to increased PPROM. Such hazards may affect both maternal and neonatal outcome such as infection, maternal distress, fetal distress, increase operative delivery, as well as need for neonatal intensive care unit care in more than 50% of the neonates.

Key words: PROM, Abortion, Risk Factors

I. INTRODUCTION

Premature rupture of the membranes (PROM) is usually defined as rupture of membranes at any time before the onset of uterine contractions. PROM which occurs prior to 37 weeks of gestation is referred as preterm premature rupture of membranes (PPROM), whereas; PROM which occurs after 37 weeks of gestation is referred as term premature rupture of membranes. The latent period is defined as the duration from rupture of the membranes until the onset of true labor⁴.

The prevalence of PROM varies in different countries and populations, and many factors affect its occurrence. Therefore, its etiology is complex and multifactorial. Two-thirds of PROM cases occur spontaneously or for unknown reasons. However, other cases are due to structural defects in the membrane due to deficiency of collagen content in the membrane, protrusion of the membrane due to isthmus-cervical incompetence, and activation of catabolic enzymes such as collagenase, the fetal membranes weakens due to enzymatic degeneration in inflammatory or infectious processes, mechanical stresses, and secretion of proteolytic enzymes from cervicovaginal flora or infection of amniotic fluids⁵.

One of the main causes of the PROM occurrence is infection (often bacterial infection) that stimulates the release of proinflammatory cytokines from decidua and amniotic membranes. Therefore, many bioactive materials, such as prostaglandins and metalloproteases are released. Prostaglandins stimulate uterine contractions, and metalloproteases cause cervical ripening, and ultimately cause the rupture of membrane⁴.
The risk factors for PROM include maternal ones, including the history of PROM in previous pregnancies (the risk of recurrence of 16% to 32% in comparison with the risk of 4% in non-complicated term pregnancies), vaginal bleeding before delivery, long-term use of steroids, vascular collagen disorders such as Ehlers-Danlos syndrome, systemic lupus erythematosus, abdominal trauma, preterm labor history, cigarette smoking, drug abuse, anemia, low BMI (under 19.8 kg/m²), food deficiencies including ascorbic acid and copper, low socioeconomic status, history of hypertension, abortion, cesarean section, black race/ethnicity, access to hospital care services, marital status, parity, history of preterm labor, exposure to diethylstilbestrol in the uterus. Other risk factors in this group are related to pregnancy complications such as gestational diabetes or overt diabetes, maternal weight gain, invasive procedures such as cerclage and amniocentesis.

PPROM is associated with a prenatal morbidity and mortality rate in excess of 20%, and the outcomes are primarily dependent on the gestational age at delivery. The key to reducing the adverse effects of PPROM is to make a prompt diagnosis, admission and start antibiotic coverage. The aim of the present study was to measure the incidence rate of PPROM among pregnant women attending Zagazig University hospital, and to identify the risk factors associated with PROM and fetal/neonatal outcomes.

II. PATIENT AND METHODS:

This a Cross sectional study, was carried out at ER department of zagazig university hospitals for vaginal deliveries, from July 2019 till January 2020, on 69 women with premature rapture of membrane.


All patients were subjected to detailed history taking including passage of liquor from vagina, Gravidity, parity, abortion (duration of pregnancy, mode of termination (spontaneous, induced), history of Prom. body mass index, weight gain during pregnancy, mode of delivery, last delivery, complication during delivery, newborn (male-female) (died-alive) and Menstrual History.

General examination: Blood pressure, Pulse, Temperature, Respiratory rate, Previous scar.

Obstetric examination was done as follow: Position the patient in the left lateral position (tilted 15° to the horizontal level) to avoid compression of the abdominal aorta and inferior vena cava by the gravid uterus (known as aortocaval compression).

The examination of sterile speculum was done and the presence of amniotic fluid was noted by collecting the fluid on slide and examining under microscope. Amniotic fluid culture and urine culture were done. All cases were administered with prophylactic IV antibiotics. In all the cases, a 4th hourly record of pulse of mothers, blood pressure and temperature was maintained and delivery was conducted within 24 hours. Fetal distress cases were delivered by emergency cesarean section.

Patients were followed till their delivery and postnatal and data regarding mode of delivery, fetal weight, APGAR score and neonatal outcome was recorded on the perform.

Main outcome measures were prevalence of preterm premature rupture of membranes before 37 weeks. Its association with maternal demographic and obstetrical variables along with mode of delivery, low birth weight perinatal morbidity and mortality and maternal morbidity.

Laboratory Investigations included; Complete blood count (CBC), C-Reactive Protein (CRP)

Nitrazine test: colour turn to deep blue from yellow due to alkalinity of amniotic fluid

Fern test: visualization fern like pattern on glass due to presence of protein and NaCl crystal
Ultrasound: detect age, weight, presentation, viability, index.

Amniotic fluid culture & urine culture.

Maternal outcomes: Mode of delivery (spontaneous vaginal or CS delivery), presence of clinical chorioamnionitis which is characterized by maternal fever (>39˚c) accompanied by at least two of the following signs: maternal or fetal tachycardia, maternal leukocytosis, uterine tenderness, or foulsmelling amniotic fluid

Fetal/Neonatal outcome: Birth weight (in Kg), alive and well, alive but needed Neonatal intensive care unit (NICU) admission, neonatal death or others (eg., neonatal infection-jaundice).

STATISTICAL METHODS

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp) Qualitative data were described using number and percent. The Kolmogorov-Smirnov test was used to verify the normality of distribution Quantitative data were described using range (minimum and maximum), mean, standard deviation, median and interquartile range (IQR). Significance of the obtained results was judged at the 5% level.

III. RESULTS:

Table 1; showed that for studied the studied cases (n=69) had mean age 26.55(±6.15 SD) with range (17-43) and median 26 (24-31). The previous table shows that the Gravidity of the cases (n=69) had mean of 2.78 (±1.82 SD) with range of (1-8) and parity mean of 1.3 (±1.33 SD) with range (0-6). There were 49 cases (previously pregnant) had abortion between (0-6) times with average 0.69 (±1.09 SD). That BMI (body mass index) of the cases (n=69) had mean 28.5 with range (24 -30). BMI- M/h² (mass in kilogram, height in meters)

The Gestational age at PROM (wks.) of studied cases (n=69) was 34.57 (±2.7 SD) with range (28-39.71), latent period (days) was 9(±6.16 SD) with range (2-42) and the gestational age at termination (wks.) was 35.85 (±2.57 SD) with range (29.14-40.29) (table 1).

Table (1): Descriptive analysis of the studied cases according to basic characteristic data of the studied groups (n = 69)

<table>
<thead>
<tr>
<th></th>
<th>No.</th>
<th>Min. – Max.</th>
<th>Mean ± SD.</th>
<th>Median (IQR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>69</td>
<td>17.0 – 43.0</td>
<td>26.55 ±6.15</td>
<td>26.0 (24.0 –31.0)</td>
</tr>
<tr>
<td>BMI</td>
<td>69</td>
<td>24-30</td>
<td>28.5 2.1</td>
<td></td>
</tr>
<tr>
<td>Gravidity</td>
<td>69</td>
<td>1.0 – 8.0</td>
<td>2.78 ±1.82</td>
<td>2.0(2.0 – 4.50)</td>
</tr>
<tr>
<td>Parity</td>
<td>69</td>
<td>0.0 – 6.0</td>
<td>1.30 ±1.33</td>
<td>1.0(1.0 – 3.0)</td>
</tr>
<tr>
<td>Abortion</td>
<td>49</td>
<td>0.0 – 6.0</td>
<td>0.69 ±1.09</td>
<td>0.0(0.0 – 1.0)</td>
</tr>
<tr>
<td>Gestational age at PROM (wks.)</td>
<td>69</td>
<td>28.0 – 39.71</td>
<td>34.57 ±2.70</td>
<td>35.0(32.36 – 36.57)</td>
</tr>
<tr>
<td>Gestational age at termination (wks.)</td>
<td>69</td>
<td>29.14 – 40.29</td>
<td>35.85 ±2.57</td>
<td>36.64(33.79 – 37.57)</td>
</tr>
</tbody>
</table>

Figure 1; showed that the risk factors of the cases were 15 with no risk factor (21.7%), 8 with previous PROM (11.6%), 6 with multi pregnancy (8.7%), 12 with Antepartum (17.4%), 16 with infections (23.2%) and 12 with chronic diseases (17.4%).

www.turkiphysiotherrehabil.org
that among the studied cases, 63 cases had single baby (91.3%), 5 cases had Twins (7.2%) and 1 case had triplets (1.4%). There were 43 male babies (56.6%) and 33 female babies (43.4%).

Table 2: showed that among the studied cases (n=69) there were 52 cases had cesarean delivery (75.4%) and 17 cases had normal vaginal delivery (24.6%).

Table 2: Distribution of the studied cases according to mode of delivery (n = 69)

<table>
<thead>
<tr>
<th>Procedure</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>Abnormal position</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Fetal distress</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Birth defect</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Repeat section</td>
<td>20</td>
<td>75.4</td>
</tr>
<tr>
<td>Chronic health condition</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Cord prolapse</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Cephalo pelvic disproportion</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>NVD</td>
<td>17</td>
<td>24.6</td>
</tr>
</tbody>
</table>
Table 3; showed that among the studied cases there were 46 mother gave birth of healthy babies with good APGAR score (66.7%), 15 with babies needed O2 incubators (21.7%) and 8 with babies were put on ventilators (11.6%).

Table (3): Distribution of the studied cases according to neonatal outcome

<table>
<thead>
<tr>
<th>Score</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good Apgar score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>At 1st minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7-10)</td>
<td>46</td>
<td>66.7</td>
</tr>
<tr>
<td>7-8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NICU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O2 mask</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;7</td>
<td>15</td>
<td>21.7</td>
</tr>
<tr>
<td>On ventilator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;4</td>
<td>8</td>
<td>11.6</td>
</tr>
</tbody>
</table>

Table 4; The outcome of mothers there were 52(75.4%) with C.S, 17(24.6%) with NVD, 66 mother with no bad outcomes and 1 with chorioamnionitis, 2(2.8%) with accidental hg.

Table (4): Distribution of the studied cases according to maternal outcome.

<table>
<thead>
<tr>
<th></th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.S</td>
<td>52</td>
<td>75.4</td>
</tr>
<tr>
<td>Chorioamnionitis</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>Abruptation placenta(accidental hg)</td>
<td>2</td>
<td>2.8</td>
</tr>
<tr>
<td>NAD (No abnormalities detected)</td>
<td>66</td>
<td>95.6</td>
</tr>
</tbody>
</table>

Figure 3; showed that among cases with no risk factors 11 gave birth of healthy fetus with good APGAR, 2 fetus needed O2 incubator 2 fetus were put on ventilator. Among cases with Previous PROM 4 gave birth of healthy babies with good APGAR, 1 with fetus needed O2 incubator and 3 with fetus were put on ventilator. Among cases with Multiple pregnancy 0 gave birth of healthy babies with good APGAR, 4 fetus needed O2 incubator and 2 fetus were put on ventilator. Among cases with Antepartum 10 gave birth of healthy fetus with good APGAR, 2 fetus needed O2 incubator and no fetus were put on ventilator. Among cases with Infections 13 gave birth of healthy fetus with good APGAR, 2 fetus needed O2 incubator and 1 fetus were put on ventilator. Among cases with Chronic disease 8 gave birth of healthy fetus with good APGAR, 4 fetus needed O2 incubator and no fetus were put on ventilator. This table showed that there was statistically significant difference between outcome of fetus as regard Risk factors of the mothers.
Figure (3): Relation between outcome and risk factor.

Figure 4; showed that for cases with babies of good APGAR there Latent Period was 5.89 (±1.64 SD) with range (3.0-7.0) and median 5. For cases with babies needed O2 incubator there Latent Period was 7.73 (±2.39 SD) with range (3.0-12.0) and median 7. For cases with babies were put on ventilator there Latent Period was 10.25 (±3.37 SD) with range (2.0-15.0) and median 10. There was high statistically significant difference between the outcome of babies as regard the Latent period.

Figure (4): Relation between outcome and Latent Period.

IV. DISCUSSION

The studied cases (n=69) had mean age 26.55(±6.15 SD) with range (17-43) and median 26 (24-31), there were 34 cases had age less than or equal to 25 years (49.3%) and 35 cases had age more than 25 years (50.7%).

Our results are in agreement with study of Negaraet al. (5) as they reported that in this study it was found that the mean age of the case group was 26.59 ± 6.49 years.

In the study by Budijaya & Surya, (6), it was found that the incidence of PROM was most common in the 21-30-year age group, 116 cases (54.72%) of 212 cases of PROM, both term pregnancies and preterm.

The present study shows that the Gravidity of the cases (n=69) had mean of 2.78 (±1.82 SD) with range of (1-8) and parity mean of 1.3 (±1.33 SD) with range (0-6). There were 49 cases (previously pregnant) had abortion between (0-6) times with average 0.69 (±1.09 SD). The Gestational age at PROM (wks.) of studied cases (n=69) was 34.57 (±2.7 SD) with range (28-39.71), latent period (days) was 9(±6.16 SD) with range (2-42) and the
gestational age at termination (wks.) was 35.85 (±2.57 SD) with range (29.14–40.29). Among the studied cases, 63 cases had single baby (91.3%), 5 cases had Twins (7.2%) and 1 case had triplets (1.4%). There were 43 male babies (56.6%) and 33 female babies (43.4%).

Based on gravida, study by Budijaya & Surya, (6) in Sanglah Hospital Denpasar found that the highest incidence of PROM occurred in primigravida group that was 87 cases (41.05%). Equal with reported by Okeke et al. (7) on a retrospective study in Nigeria, the highest incidence of preterm PROM cases occurred in primigravida group of 29.1%. Patil et al. (8) in his study at MR Medical College, Gulbarga by 53%. Noor et al. (9) reported that the incidence of PROM was also highest in primigravida cases (42.2%). Other studies have reported that the incidence of PROM also occurred in primigravida of 68.2%, 52%, 69.7% (10).

The current study shows that the studied cases (n=69) there were 52 cases had cesarean delivery (75.4%) and 17 cases had normal vaginal delivery (24.6%).

Our results are supported by study of Sae-Lin & Wanitpongpan, (11) as they reported that 39.7% of their cases had cesarean section.

Furthermore, Noor et al. (9) found that normal vaginal delivery was the commonest mode of delivery (56 cases, 65.86%), while instrumental delivery rate was 20% (17 cases) and caesarean section rate was 14% (12 cases).

In the study in our hands, that among the studied cases there were 46 mothers gave birth of healthy babies with good APGAR score (66.7%), 15 with babies needed o2 incubators (21.7%) and 8 with babies were put on ventilators (11.6%). The outcome of mothers there were 68 mothers with no bad outcomes and 1 with chorioamnionitis.

Our results are supported by study of Bouvier et al. (12) as they reported that the complications associated with PPROM were oligohydramnios (aOR: 4.17 (2.37–7.35)), abruptio placentae (aOR: 4.28 (1.87–9.78)), cesarean (aOR: 1.41 (1.02–1.96)), APGAR 5’<4 (aOR: 23.32 (7.04–77.19)), birth weight <2500 g (aOR: 47.74 (32.52–70.08)), stillbirth (1.1% in PPROM group versus 0% in control group, p < 0.0001), neonatal jaundice (aOR: 3.25 (2.20–4.80)), hospitalization of mother (aOR: 1.75 (1.15–2.65)), and admission at the neonatal intensive care unit (aOR: 17.12 (12.23–23.98)). All these complications were also associated with sPL with IM (spontaneous preterm labor with intact membranes).

The present study shows that the risk factors of the cases were 15 with no risk factor (21.7%), 8 with previous PROM (11.6%), 6 with multi pregnancy (8.7%), 12 with Antepartum (17.4%), 16 with infections (23.2%) and 12 with chronic diseases (17.4%).

Among cases with no risk factors 11 gave birth of healthy babies with good APGAR, 2 with babies needed o2 incubator and 2 with babies were put on ventilator. Among cases with Previous PROM 4 gave birth of healthy babies with good APGAR, 1 with babies needed o2 incubator and 3 with babies were put on ventilator. Among cases with Multiple pregnancy 0 gave birth of healthy babies with good APGAR, 4 with babies needed o2 incubator and 2 with babies were put on ventilator. Among cases with Antepartum 10 gave birth of healthy babies with good APGAR, 2 with babies needed o2 incubator and 0 with babies were put on ventilator. Among cases with Infections 13 gave birth of healthy babies with good APGAR, 2 with babies needed o2 incubator and 1 with babies were put on ventilator. Among cases with Chronic disease 8 gave birth of healthy babies with good APGAR, 4 with babies needed o2 incubator and 0 with babies were put on ventilator. There was statistically significant difference between outcome of the babies as regard Risk factors of the mothers.

Several studies from USA, Sweden, India, Thailand, Egypt, Nigeria and Uganda revealed that previous PROM was a significant risk factor for premature rupture of membranes (3).

This study also showed that previous PROM to be the strongest risk factor for premature ruptures of membranes. Women who had previous PROM were 4.45 more likely to develop PROM with AOR 4.45 (CI: 1.87, 10.6). This might be due to untreated genitourinary infection and a short cervical length. In addition, obstetric problems are recurrent by nature.
In our study Vaginal bleeding, Accident, gestational age, Gravidity, parity, presentation, Polyhydramnious, multiple pregnancy, Anemia and Pregnancy Induced Hypertension were not found to be a significant predictor of premature rupture of membranes. This is discordant with findings from a research conducted in Sweden, Lithuania and India(3).

According to Bouvier et al. (12), confirmed the most known risk factors for PPROM, such as BMI <18.5 kg/m2, history of PPROM or prematurity, nulliparity, multiple pregnancies, low level of education, and infections. These results, as well as the percentage of PPROM (2.7%), validated the cohort, which is comparable with others(13).

Infections, history of prematurity, and multiple pregnancies are known risk factors of both PPROM and also sPL with IM. The association of infection with prematurity at large is in line with recent hypotheses presenting infection in PPROM as a downstream event rather than a causal factor Menon & Richardson, (14). Recent reports indicated that PPROM might be associated with the presence of sterile inflammation in the fetal membranes. Sterile inflammation may be responsible for the link between GDM and PPROM(15).

Although infection has been accepted as a major risk factor of PPROM, many of previous preventive strategies by antibiotics seemed unsatisfactory and did not help to reduce the incidence(16). Complications of PROM can occur either on the infants or maternal. Maternal complications such as chorioamnionitis are found in 9% of pregnancies with premature rupture of membranes, risks of up to 24% if rupture of membranes occurs more than 24 hours. In preterm pregnancies, the incidence was greater between 13-60%(17).

The current study shows that for cases with babies of good APGAR their Latent Period was 8.89 (±6.64 SD) with range (3-42) and median 7. for cases with babies needed O2 incubator their Latent Period was 9.73 (±5.69 SD) with range (3-22) and median 7. for cases with babies were put on ventilator their Latent Period was 8.25 (±4.37 SD) with range (3-15) and median 7. There was no statistically significant difference between the outcome of babies as regard the Latent period.

Tchirkov et al. (18) found that the lack of information on the prolongation of pregnancy after PPROM (latency period) could be considered as a potential limitation. Indeed, a latency period could be associated with a higher incidence of complications.

The complications associated with PPROM, such as oligohydramnios, abruption placentae, APGAR 5’ <4, weight <2500 g, stillbirth, neonatal jaundice, and hospitalization of neonates in NICU, are not related to PPROM per se but are associated with prematurity(19).

PROM increased the incidence of RDS and other respiratory diseases in full-term and premature infants(20).

There was an increased probability of PROM neonates needing to be treated in hospital, so prolonging the period of hospitalization and increasing the in-hospital costs. The duration of hospitalization of neonates was prolonged by 20.0% in full-term infants and by 25.1% in premature infants with PROM, and the total in-hospital costs were increased by 30.5% in full-term infants with PROM and by 60.0% in premature infants with PROM(21).

V. CONCLUSIONS

We can conclude that, younger, illiterate parturient women were found to be provoking factors to increased PPROM. Such hazards may affect both maternal and neonatal outcome such as infection, maternal distress, fetal distress, increase operative delivery, as well as need for neonatal intensive care unit care in more than 50% of the neonates.

Based on our results we recommend for further studies in larger patients and longer period of follow up to emphasize our conclusion. Women diagnosed as having PROM should be hospitalized early and followed up until delivery with adequate neonatal intensive care unit.

www.turkjphysiotherrehabil.org
REFERENCES:


